

## **Background of the invention**

### **(1) Field of the invention**

This invention relates to a self-leveling and balancing vehicle, especially a vehicle which can be kept on the level and balance position when it is moving  
5 on a slope or uneven road.

### **(2) Description of the Prior Art**

To run on a slope is a common thing for various vehicles, however, such vehicles will decline when they run on the slope. Accordingly, once the vehicles run on a slope, the people or objects in the vehicles may fall down or collide with  
10 each other, even the vehicles may turn over to cause accidents. Reference to the China Patent No. 99116012.6, a leveling device for vehicles has been researched and developed to solve the above problems, the leveling device for vehicles ( such as shown in Fig.8) having a base A and a driving system B, two sides of the base having respectively a sector gear A1, the sector gears being engaged  
15 respectively with the driving gears B1 of the driving system B installed on a seat C of the vehicle, thus the seat C can be kept on the level position when it is running on a slope by adjusting the angle between the driving gears B1 and the sector gears A1. However, such leveling device only can keep the seat of vehicle on the level position but can't keep the vehicle on balance. Accordingly, the  
20 vehicle with such leveling device still may turn over on a steep slope beyond 40 degree because it can't keep one's balance, further, the driving gears B1 and the sector gears A1 can't be engaged with each other firmly.

## **Summary of the invention**

It is therefore the main object of this invention to provide a self-leveling

and balancing vehicle which can be kept on the level and balance position when it is running on a steep slope to prevent the people or objects on the vehicle from falling down or colliding with each other.

The above vehicle is composed of a base and a moving and driving  
5 mechanism installed on the base, the moving and driving mechanism having two longitudinal moving seats, a connecting frame extending to connect the longitudinal moving seats and two sector gears installed on the two longitudinal seats respectively, a driving motor and a level sensor being installed on the connecting frame, the driving shaft of the driving motor extending to the sector  
10 gears, further two level driving gears being installed on two end of the driving shaft and engaged with the two sector gears, a balance driving gear box being installed on the driving shaft and having an output shaft extending to the connecting frame and can be rotated freely, further two driven gears being installed on two ends of the output shaft;

15 the base having two guiding rails paralleled with moving direction of the vehicle, the longitudinal moving seats can be mounted on the two guiding rails respectively, further two racks being fixed between and paralleled with the two guiding rails, the driven gears on the output shaft being engaged with the two racks;

20 once the vehicle running up or down a slope, the level sensor can start the driving motor automatically to drive the driving shaft to make the level driving gears can be rotated along the sector gears to adjust the chair or platform on the connecting frame to level position, meanwhile, the two driven gears installed on the output shaft can be rotated reversely with the driving shaft and moved

forward or backward along the racks to make the moving and driving mechanism move simultaneously along the guiding rails to balance position.

### **Brief description of the drawings**

In the drawings, which illustrate the preferred embodiments and modes of operation of the invention, and in which like reference characters designate the same or similar parts throughout the several views:

Fig.1 is a plan view showing the longitudinal moving mechanism of a self-leveling and balancing vehicle of this invention;

Fig.2 is a sectional view of the wheel chair on line A-A in Fig.1;

Fig.3 is a plan view showing the self-leveling and balancing vehicle of this invention;

Fig.4 is a left side elevational view of this invention;

Fig.5 is a plan view showing the status of the self-leveling and balancing vehicle running on a slope;

Fig.6 is a plan view showing another embodiment of this invention;

Fig.7 is a plan view showing still another embodiment of this invention; and

Fig.8 is an exploded view showing a conventional wheel chair with a leveling device.

### **Detailed description of the preferred embodiments**

Referring to Fig.1 to Fig.4, the present invention, a self-leveling and balancing vvehicle, is composed of a moving and driving mechanism 1 and a base 2, wherein the moving and driving mechanism 1 being installed on the base 2. The moving and driving mechanism 1 have two longitudinal moving seats 11

formed at its two sides respectively, a connecting frame 12 extending to connect the longitudinal moving seats 11 and two sector gears 13 installed on the two longitudinal seats 11 respectively. There is a driving motor 145 fixed under the top of the connecting frame 12, the driving motor 145 have a driving shaft 14  
5 extending to the sector gears 13, two ends of the driving shaft 14 being equipped with two level driving gears 141 which can be engaged firmly with the inward teeth of the two sector gears 13. There is a balance driving gear box 142 installed on the driving shaft 14 and between the two sector gears 13, the output shaft 143 of the balance driving gear box being located at the connecting frame 12 and can  
10 be rotated freely, further, two last driven gears 1421, 1431 being installed on the output shaft 143.

Referring to Fig.2, there are two guiding rails 112 installed on two sides of the base2, the sliding grooves 111 of the two longitudinal seats 11 being fitted on the guiding rails 112 respectively, however, the fitting between the sliding  
15 groove and the guiding rail can be a dove-tail joint or other kinds of joint. Two racks 21 are installed on two supporting posts 211 which are fixed on the base 2 and between the two guiding rails 112, the two racks 21 being parallel with moving direction of the wheel chair, further, the driven gears 1421, 1431 on the output shaft 143 of the balance driving gear box 142 being engaged respectively  
20 with the two racks 21 to make the moving and driving mechanism 1 can be moved on the base 2.

The balance driving gear box 142 is composed of a case 1422 and even number of engaged gears, such as two or four gears, in this embodiment, the balance driving gear box 142 having four gears. The driving gear 144 in the

balance driving gear box 142 is installed on the driving shaft 14 and the driven gear 1421 is installed on the output shaft 143, further, the driven gear 1421 being rotated reversely with the driving gear 144 by means of the two medium gears.

The connecting frame 12 have a level sensor herein (not shown in figures),  
5 the level sensor can detect whether the vehicle is on the level position, if not, the level sensor can start the driving motor 145 to drive the level driving gears 141 and the balance driving gear box 142 to adjust the vehicle to level and balance position. Two sides of the connecting frame 12 are formed into triangular supporting shape 121, the lower part of two sides of the connecting frame 12  
10 having a first locating hole 1211 respectively, two ends of the output shaft 143 of the balance driving gear box 142 can be installed in the first locating holes 1211 and rotated freely, further, the upper part of two sides of the connecting frame 12 having a second locating hole 1212 respectively aligned with the first locating hole 1211, two ends of the driving shaft 14 of the driving motor 145 can be  
15 installed in the second holes 1212 and rotated freely. The top of the connecting frame 12 can be equipped with a chair or carry platform for carrying people or other cargoes.

The base 2 is composed of a top plate 22, a bottom plate 23 and three supporting posts 24 installed between the top plate 22 and the bottom plate 23,  
20 top end of each supporting post 24 being pivoted on the top plate 22 and the bottom end being fixed on the bottom plate 23, further, a compression spring being installed on the supporting post 24 for absorbing the vibration on the rough road. There are two idler wheels 25 installed near to the bottom center of the base 2, in each idler wheel having a compression spring (not shown in figures) for

supporting the vehicle when it is climbing up the steps.

Referring to Fig.1 and Fig.5, the level sensor can detect automatically the vehicle is not on the level position when the vehicle is running up a slope, meanwhile, the level sensor can start the driving motor 145 to rotate the driving shaft 14 clockwise, thus the level driving gears 141 can rotate counterclockwise along the sector gears 13 to adjust the chair or carry platform on the connecting frame 12 to the level position, further, the driving gear 144 in the balance driving gear box 142 can drive the driven gears 1421, 1431 to rotate counterclockwise and moved forward along the racks 21, such that, the moving and driving mechanism 1 can be moved forward along the guiding rails 121 to the balance position. On the other hand, the driving motor 145 can drive the driving shaft 14 to rotate counterclockwise so as to adjust the chair or carry platform on the moving and driving mechanism 1 to the level and balance position when the vehicle is running down a slope.

Accordingly, the present invention provide a self-leveling and balancing vehicle, once the vehicle running up or down a slope, the chair or platform on the moving and driving mechanism can be rotated and moved to the level and balance position automatically so as to prevent the people or other cargos on the vehicle from falling down or colliding with each other.

The Fig.6 shows another embodiment of this invention, the chair installed on the moving and driving mechanism 1 can be replaced with a carry platform for carrying people or other cargos. The Fig.7 shows still another embodiment of this invention, the wheels of vehicle can be replaced with a caterpillar tread, further the two idler wheels 25 being installed near to the inner top center of the

base 2, in each idler wheel having a compression spring 251 for supporting the vehicle when it is climbing up the steps.

It is understood by those skilled in the art that the foregoing description is a preferred device and that various changes and modifications may be made in  
5 the invention without departing the spirit and scope thereof.